A REVISED CLASSIFICATION FOR THE ORDERS AND FAMILIES OF MOSSES

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The present paper is partly in response to many requests by non-bryologists for a listing of higher categories of mosses, but also, it seems advantageous to have a listing that can be used in conjunction with the recent list of orders and families of hepaticae by Schuster (1966). Thus, I take the opportunity to provide the following version that incorporates some recent evolutionary evidence and some personal opinion.

The general history of moss classification is given by Dixon (1932) and there are some more recent comments by Schaffner (1938) and Steere (1958). The history shows the early use of three orders, Sphagnales, Andreaeales and Bryales. Later, additional orders were recognized by Fleischer, Brotherus and Dixon and in the last author's work the Bryales were divided into Tetraphidales, Calomniales, Schistostegales, Buxbauminales, Polytrichales, Fissidentales, Grimmiales, Dicranales, Syrrhopodontales, Pottiales, Encalyptales, Orthotrichales, Funariales, Eubryales, Isobryales, Hookeriales, and Hypnobryales. My own views fall between these extremes and are rather conservative.

Regarding the higher categories, I recognize a single Division, Bryophyta, which I consider a natural group. Aside from the lack of vascular tissue, I would distinguish this natural group by the unbranched sporophyte which I consider to be derived from branched sporophytes of a non-bryophyte ancestor. For the basic subdivision between the hepatics and the mosses I recognize two prime characters, (1) the elongation in the base of the apically mature sporophyte in the former group versus the strictly apical growth in the latter, and (2) the tendency for fusion in gametophyte tissues (perianths, leaves, etc.) in the former versus strict separation of vegetative parts in the latter.

At lower levels of classification I accept Sphagnum and its fossil relatives as distinct at the subclass level. The most useful distinction of the group seems to be the difference in the ultimate divisions of the leaf cells. The five orders I recognize in the subclass Bryidae reflect a reduction in the comparative status of the Andreaeales which I do not consider more distinct than the Tetraphidales. These two orders I view as rather primitive, and the fact that they and Sphagnum all have thalloid or other non-filamentous aspects to their protonemata seems significant. What has been called Bryales I recog-

nize as four orders. The previous major subdivisions of the Bryales compare as follows: Nematodonteae becoming two orders, Tetraphidales and Polytrichales, and Arthrodonteae becoming two orders, Dicranales (=Haplolepideae) and Bryales (=Diplolepideae). In this arrangement I would place the Polytrichales much closer to the Dicranales and there is no one character that will distinguish all the genera of these two orders. I find the peristome of the Polytrichaceae to be completely different in origin from that of other mosses and probably a more recent development. The Dawsoniaceae which are in the same order retain a peristome of a more primitive type.

At the family level I have adopted some changes proposed by Andrews for the Leucobryaceae (1947) and Rhytidiaceae (1954). I retain the Leptostomataceae which Andrews (1951) placed in the Bryaceae. The following arrangement of the families allows for certain similarities that may or may not indicate relationships. I have placed the Schistostegaceae with the Mitteniaceae on the basis of observations of the protonemata of Mittenia by Stone (1961, 1962). Two personal opinions are represented in my placement of the Fissidentaceae and the Hookeriaceae. As I intend to indicate elsewhere, I regard the leaf form of the Fissidentaceae as the product of a rather simple evolutionary process, and I place the family close to the Dicranaceae. I place the Hookeriaceae with other families, many members of which share such characters as a median furrow on the outer surface of the peristome, short or double costae, and almost undifferentiated alar cells. This Hookeroid-Hypnoid complex I consider quite distinct from either the strongly costate Leskeoid-Brachythecioid complex or the Pterobryoid-Neckeroid complex that often shows preperistome development.

Division Bryophyta
  Class Bryatae
    Subclass Sphagnidae
      Order Protosphagnales
        Family Protosphagnaceae (fossil)
        Family Intiaceae (fossil)
      Order Sphagnales
        Family Sphagnaceae
    Subclass Bryidae
      Order Andreaeales
        Family Andreaeaceae
      Order Tetraphidales
        Family Tetraphidaceae (=Georgiaceae)
      Order Polytrichales
        Family Polytrichaceae
        Family Dawsoniaceae
      Order Dicranales
        Family Archidiaceae
        Family Ditrichaceae

Family Bryoxiphiaceae
Family Seligeriaceae
Family Grimmiaceae (including Ptychomitriaceae)
Family Fissidentaceae (including Archifissidentaceae)
Family Dicranaceae (including part of Leucobryaceae)
Family Dicnemonaceae
Family Pleurophascaceae
Family Calymperaceae (including part of Leucobryaceae)
Family Pottiaceae (including Trichostomaceae, Cinclidotaceae, Splachnobryum)
Family Bryobartramiaceae
Family Encalyptaceae
Family Buxbaumiaceae
Family Diphysciaceae

Order Bryales
Family Rhacitheciaceae
Family Erpodiaceae
Family Helicophyllaceae
Family Orthotrichaceae

Family Gigaspermaceae
Family Disceliaceae
Family Ephemeraceae
Family Funariaceae
Family Splachnaceae

Family Schistostegaceae
Family Mitteniaceae
Family Drepanophyllaceae
Family Calomniaceae

Family Eustichiaceae
Family Sorapillaceae

Family Timmiaceae

Family Bryaceae
Family Leptostomataceae
Family Mniaceae
Family Aulacomniaceae
Family Meeseaceae
Family Catoscopiaceae
Family Bartramiaceae

Family Rhizogoniaceae
Family Spiridentaceae
Family Hypnodendraceae
Family Hypopterygiaceae
Family Rhacopilaceae

Family Fontinalaceae

Family Wardiaceae
Family Hedwigiaceae
Family Cryphaeaceae
Family Leucodontaceae
Family Cyrtopodaceae
Family Prionodontaceae
Family Lepyrodontaceae
Family Rutenbergiaceae
Family Trachypodaceae
Family Myuriaceae
Family Pterobryaceae
Family Meteoriaceae
Family Phyllogoniaceae
Family Neckeraceae
Family Lembophyllaceae

Family Climaciaceae
Family Pleuroziopsidaceae

Family Echinodiaceae
Family Fabroniaceae
Family Leskeaceae (including Theliaceae, Thuidiaceae)
Family Amblystegiaceae
Family Brachytheciaceae (including Rigodium)

Family Entodontaceae
Family Plagiotheciaceae

Family Ephemeropsidaceae (=Nemataceae)
Family Hookeriaceae (including Pilotrichaceae)
Family Ptychomniaceae
Family Symphyodontaceae
Family Leucomiaceae
Family Sematophyllaceae
Family Hypnaceae (including Rhytidiaceae)
Family Hylocomiaceae

Family Hydropogonaceae

Literature Cited

Andrews, A. Leroy 1947. Taxonomic notes VI. The Leucobryaceae. The Bryologist 50: 319-326.

_____. 1951. Taxonomic notes X. The family Leptostomaceae. The Bryologist 54: 217-223.

Andrews, A. Leroy 1954. Taxonomic notes XII. The families Rhytidiaceae and Hylocomiaceae. The Bryologist 57: 251-261.

Dixon, H. N. 1932. Chapter XIV. Classification of mosses. 397-412. in Fr. Verdoorn ed. Manual of Bryology. 486 pp. Martius Nijhoff, The Hague.

Schaffner, J. H. 1938. The natural orders of the true mosses. The Bryologist 41: 57-63.

Schuster, R. M. 1966. The Hepaticae and Anthocerotae of North America—East of the Hundredth Meridian. Vol. 1. 822 pp. Columbia University Press, New York.

Steere, W. C. 1958. Evolution and speciation in mosses. The Amer. Natur. 92: 5-20.

Stone, Ilma G. 1961. The gametophyte and sporophyte of Mittenia plumula (Mitt.) Lindb. Aust. Journ. of Bot. 9(2): 124-151, pl. 1-4.

_____. 1962. The highly refractive protonema of Mittenia plumula (Mitt.) Lindb. (Mitteniaceae). Proc. Roy. Soc. Vict. 74: 119-124.